WHAT IS CLAIMED IS:

1. A method of detecting a structural chromosomal aberration comprising:
   (a) preparing a plurality of nucleic acid probes each capable of hybridizing with a separate nucleic acid flanking sequence brought together by the chromosome aberration;
   (b) contacting the probes with chromatin under conditions of appropriate stringency to allow hybridization of the probes to sequences homologous with the probe sequences; and
   (c) detecting the presence of the probes.

2. The method of detecting a chromosomal aberration of claim 1 wherein the probes are labelled.

3. The method of detecting a chromosomal aberration of claim 2 wherein each probe label is distinct from each other.

4. The method of detecting a chromosomal aberration of claim 3 wherein the probes are further defined as at least approximately 800 kb apart.

5. The method of detecting a chromosomal aberration of claim 4 wherein the labels comprise fluorescent labels.

6. The method of detecting a chromosomal aberration of claim 5 wherein the fluorescent labels are microscopically distinct as different colors.

7. The method of detecting a chromosomal aberration of claim 6 wherein the fluorescent labels comprise digoxigenin-11-dUTP and biotin-11-dUTP.

8. The method of detecting a chromosomal aberration of claim 1 wherein the chromatin-probe contacts occur *in situ* in cells.

9. The method of detecting a chromosomal aberration of claim 8 wherein the cells comprise those in interphase of mitotic division.

10. The method of detecting a chromosomal aberration of claim 9 wherein the probes are juxtaposed in interphase as doublets if a chromosomal aberration is present.

11. The method of detecting a chromosomal aberration of claim 10 wherein the chromosomal aberration is further defined as comprising a translocation.

12. The method of detecting a chromosomal aberration of claim 11 wherein the translocation is formed by breakpoints which occur on the long arms of human chromosomes No. 9 and No. 22.

13. The method of detecting a chromosomal aberration of claim 12 wherein the translocation breakpoints are further defined as occurring at the locations designated t(9;22)(q11;q34).

14. The method of detecting a chromosomal aberration of claim 13 wherein the translocation breakpoints are further defined to occur in the BCR and ABL genes respectively, and a fusion gene is formed by the translocation, and said fusion gene comprises portions of the BCR and ABL genes.

15. The method of detecting a chromosomal aberration of claim 14 wherein the fusion gene is designated as p190.

16. The method of detecting a chromosomal aberration of claim 10 wherein the probes consist of those selected from probes designated PEM12, c-H-abl and MSB-1.

17. The method of detecting a chromosomal aberration of claim 8 wherein the cells comprise samples of human tissues.

18. The method of detecting a chromosomal aberration of claim 17 wherein the human tissue samples comprise peripheral blood.

19. The method of detecting a chromosomal aberration of claim 17 wherein the human tissue samples comprise bone marrow.

20. The method of detecting a chromosomal aberration of claim 8 wherein the cells comprise a sample of cultured cells.

21. A genetic probe capable of hybridizing to the 5'region of the major breakpoint cluster region (M-bcr) of chromosome 22 as illustrated in FIG. 2A and FIG. 4.

22. A genetic probe capable of hybridizing to the first exon region of the BCR gene as illustrated in FIG. 2A.

23. A genetic probe designated as c-H-abl and capable of hybridizing to the 3' end of the ABL gene as illustrated in FIG. 5 and FIGS. 2B and 2C.

24. The genetic probe of claim 21 wherein the probe comprises the designation PEM12.

25. The genetic probe of claim 22 wherein the probe comprises designation MSB-1.

26. The genetic probe of claim 23 wherein the probe comprises designation c-H-abl.

27. The method of detecting a chromosomal aberration of claim 1 wherein the plurality of probes comprise MSB-1, PEM12 and c-H-abl, and said probes are contacted to chromosomes in pairs.

28. The method of detecting chromosomal aberrations of claim 27 wherein a first pair comprises MSB-1 and c-H-abl, and a second pair comprises PEM12 and c-H-abl.

29. A kit for the detection of chromosomal aberrations comprising at least two genetic probes selected from claims 21, 22 and 23, and appropriate controls, each in separate containers.

30. A kit for the detection of cancer in human cells, comprising:

a) a carrier being compartmentalized to hold multiple containers;

b) a first pair of containers including the pair of genetic probes of claims 21 and 23; and

c) a second pair of containers containing the pair of genetic probes of claims 22 and 23.